PART I - ADMINISTRATIVE

Section 1. General administrative information

Title of project

Libby Fisheries Mitigation

BPA project number: 20517
Contract renewal date (mm/yyyy): ☒ **Multiple actions?**

Business name of agency, institution or organization requesting funding
Montana Department of Fish, Wildlife and Parks

Business acronym (if appropriate) MFWP

Proposal contact person or principal investigator:

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NPPC Program Measure Number(s) which this project addresses
Program Measures10.1B, 10.1C.1, 10.3B, 10.3B.2, 10.3B.3, 10.3B.5, 10.3B.6, 10.3B.7, 10.3B.10 and 10.3B.11.

FWS/NMFS Biological Opinion Number(s) which this project addresses
Kootenai River White Sturgeon Biological Opinion (59 FR 45989)
NMFS Hydrosystem Operations for Salmon Recovery (56 FR 58619; 57 FR 14653)
Bull Trout Listing (62 FR 31647)
Westslope Cutthroat Trout proposed listing (63 FR 31691)

Other planning document references

Fisheries Mitigation and Implementation Plan for Losses Attributable to the Construction and Operation of Libby Dam (MFWP,CSKT and KTOI 1998).

Kootenai Watershed Programmatic Habitat and Physical Parameter Review (Bibliography)Open File Report – MFWP-Libby, MT

Bull trout and westslope cutthroat trout recovery plans and actions (Montana Bull Trout Restoration Team 1997; Montana Bull Trout Scientific Group 1995; MFWP and CSKT 1991, 1993; Montana Westslope Cutthroat Trout Recovery Team, in prep.)

Fisheries Losses Attributable to Reservoir Drawdown In Excess of Limits Stated in the Columbia Basin Fish and Wildlife Program: Hungry Horse and Libby Dams 1987-1991 (Marotz and DosSantos 1993); Fisheries Losses Attributable to Reservoir Drawdown In Excess of Limits in the Columbia Basin Fish and Wildlife Program: Hungry Horse and Libby Dams 1991-1993 (MFWP and CSKT 1997).

Short description
Enhance and protect native fish communities in the Kootenai Basin through multi-species watershed assessments, off-site habitat protection and enhancement, improved river flow and temperature conditions, and river and reservoir operation strategies.

Target species
Westslope cutthroat trout, Kootenai River white sturgeon, bull trout, burbot, inland rainbow trout.

Section 2. Sorting and evaluation

Subbasin
Kootenai Subbasin, Upper Columbia

Evaluation Process Sort

CBFWA caucus	Special evaluation process	ISRP project type
Mark one or more caucus	If your project fits either of these processes, mark one or both	Mark one or more categories
☐ Anadromous fish ☒ Resident fish ☐ Wildlife	☒ Multi-year (milestone-based evaluation) ☒ Watershed project evaluation	☐ Watershed councils/model watersheds ☐ Information dissemination ☐ Operation & maintenance ☐ New construction ☒ Research & monitoring ☒ Implementation & management ☐ Wildlife habitat acquisitions

Section 3. Relationships to other Bonneville projects

Umbrella / sub-proposal relationships. List umbrella project first.

Project #	Project title/description

20517	Libby Fisheries Mitigation Program
9401001	MFWP- Libby Reservoir Excessive Drawdown
8346500	Libby and Hungry Horse Modeling Technical Analysis - Libby Component
8346700	Mitigation for the Construction and Operation of Libby Dam
	Purchase Conservation Easement from Plum Creek Timber Company Fisher River.

Other dependent or critically-related projects

Project #	Project title/description	Nature of relationship
8806500	IDFG-Kootenai River Fisheries Investigations	White Sturgeon Recovery
8806400	KTOI – White Sturgeon Experimental Aquaculture	White Sturgeon Recovery
9404900	Kootenai River Ecosystem Improvement Study	Ecosystem Function
9608702	MFWP - Focus Watershed Coordination-Kootenai Drainage	The umbrella projects of Libby Fisheries Mitigation is the mechanism by which local watershed plans developed by the FWC are funded and implemented. FWC provides technical support and faciltiates public input into mitigation program

Section 4. Objectives, tasks and schedules

Past accomplishments

Year	Accomplishment	Met biological objectives?
	See Umbrella Sub-proposals	

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Implement NPPC-approved Libby Mitigation and Implementation Plan	a	Complete habitat restoration projects listed in the Plan (see subproposal 8346700)
		b	Design and scope new mitigation projects following established project selection criteria (MFWP 1998).
		c	Select, scope and implement off-site restoration projects

		b	Conduct project-specific and watershed-level monitoring
2	Implement BPA-approved mitigation for excessive drawdowns at Koocanusa Reservoir. (see project # 9401000)	a	Scope, design and implement habitat restoration projects identified in local watershed plans (Project # 9608720) and mitgation planning with a focus on core recovery areas associated with impacts from drawdowns on native, ESA and proposed ESA species
2		b	Initiate and monitor inovative native species recovery and monitoring methods
2		c	Cooperatively monitor international (upper Kootenai) populations and habitat health for bull trout
3	Perform modeling and technical analysis to improve dam operations	a	Link reservoir model LRMOD with IFIM model
		b	Assess effects of ramping of Kootenai River macrozoobenthos

Objective schedules and costs

Obj #	Start date mm/yyyy	End date mm/yyyy	Measureable biological objective(s)	Milestone	FY2000 Cost %
			See project sub-proposals		
				Total	0.00%

Schedule constraints
We must implement many mitigation actions simultaneously so that as some individual projects are delayed by permitting, contracting or public input, others continue through completion. Our goal is to finalize several site-specific projects annually.

Completion date
2055

Section 5. Budget

FY99 project budget (BPA obligated):

FY2000 budget by line item

Item	Note	% of total	FY2000
Personnel	PLEASE SEE SUBPROPOSALS	%0	
Fringe benefits		%0	
Supplies, materials, non-expendable property		%0	
Operations & maintenance		%0	
Capital acquisitions or improvements (e.g. land, buildings, major equip.)		%0	
NEPA costs		%0	
Construction-related support		%0	
PIT tags	# of tags:	%0	
Travel		%0	
Indirect costs		%0	
Subcontractor		%0	
Other		%0	
TOTAL BPA FY2000 BUDGET REQUEST			$ 0

Cost sharing

Organization	Item or service provided	% total project cost (incl. BPA)	Amount ($)
USFS	Financial and physical support for a proposed westslope cutthroat trout and inland rainbow trout conservation plan in the Yaak River drainage ($25K in FY99; anticipate field support in FY2000 (in kind)).	%0	
Kootenai River Network	Completion of a watershed bibiography for the Kootenai River Basin (in kind).	%0	
US Army Corps of Engineers	75/25 cost share for channel stabilization Young Creek (being negotiated by project # 9608720 Focus Watershed Coordination- Kootenai River Watershed)	%64	168,750

US Army Corps of Engineers (25%) and Libby Area Conservancy District (25%)	50/50 cost-share for channel stabilzation of Libby Creek (being negotiated by project # 9608720 Focus Watershed Coordination- Kootenai River Watershed)	%29	76500
BC Environment	40- coded,high frequency, 50 month transmitters	%4	11,000
BC Environment	Operating migrant trap on Wigwam River. BPA funds contract labor and BC Environment coodinates equipment, support and logistics	%2	6000
		%0	
		Total project cost (including BPA portion)	$262,250

Outyear costs

	FY2001	**FY02**	**FY03**	**FY04**
Total budget	$-0			

Section 6. References

Watershed?	**Reference**
☐	Anders, P. J. 1993. Natural spawning of white sturgeon in the Kootenai River. Annual Hatchery Report FY1993, Report A. Kootenai Tribe of Idaho for Bonneville Power Administration, Portland, OR.
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☐	Bovee, K.D. 1978. Probability-of-use criteria for the family Salmonidae. Instream Flow Information Paper 4. United States Fish and Wildlife Service FWS/OBS-78/07. 79pp.
☐	Bovee, K.D. 1982. A guide to stream habitat analysis using the Instream Flow Incremental Methodology. Instream Flow Information Paper 12. United States Fish and Wildlife Service FWS/OBS- 82/26. 248pp.
☐	Bovee, K.D. 1986. Development and evaluation of habitat suitability criteria for use in the Instream Flow Incremental Methodology. In-stream Flow Information Paper 21. United States Fish and Wildlife Service, Biological Report 86(7). 235pp.

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☐	Chisholm, I.M. and J.J. Fraley. 1986. Quantification of Libby Reservoir levels needed to maintain or enhance reservoir fisheries. Annual report. Prepared for BPA by MFWP, Kalispell, MT. Project 83-467.
☐	Chisholm, I.M., M.E. Hensler, B. Hansen, D. Skaar. 1989. Quantification of Libby Reservoir levels needed to maintain or enhance reservoir fisheries. Methods and Data Summary 1983-1987. Prepared for BPA by MFWP, Kalispell, MT. Project 83-467.
☐	Cushman, R.M. 1985. Review of ecological effects of rapidly varying flows downstream from hydroelectric facilities. North American Journal of Fisheries Management. 5:330-339.
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☐	Greenback, J. 1941. Selective poisoning of fish. Transactions of American Fisheries Society. 70:80-86.
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☐	Huston, J. E., P. Hamlin and B. May. 1984 Lake Koocanusa Investigations – Final Report 1972-1983. Montana Department of Fish, Wildlife and Parks – Region 1 in cooperation with Seattle District ACOE.
☐	ISAB. 1997. The Normative River. Independent Scientific Advisory Board report to the Northwest Power Planning Council and National Marine Fisheries Service. Portland, OR.
☐	ISAB. 1997b. Ecological impacts of the flow provisions of the Biological Opinion for endangered Snake River salmon on resident fishes in the Hungry Horse, and Libby systems in Montana, Idaho, and British Columbia. Report 97-3.
☐	ISG. 1996. Prepublication Copy. Return to the River: Restoration of salmonid fishes in the Columbia River ecosystem. Development of an alternative conceptual foundation and review and synthesis of science underlying the FWP. Document 96-6.
☐	Leathe, S.A. and P.J. Graham. 1982. Flathead Lake fish food habits study. Final Report. Prepared for the Environmental Protection Agency by Montana Department of Fish, Wildlife and Parks. Kalispell, Montana.

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☐	Milhous, R.T., M.A. Updike, and D.M. Schneider. 1989. Reference manual for the Physical Habitat Simulation system (PHABSIM) - Version II. Instream Flow Information Paper 26. United States Fish and Wildlife Service Biological Report 89.
☐	Milhous, R.T., D.L. Wegner, and T. Waddle. 1984. User's guide to the Physical Habitat Simulation System (PHABSIM). Instream Flow Information Paper 11. United States Fish and Wildlife Service FWS/OBS-81/43. 320pp.
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☐	Woods, P. F. and C. M. Falter. 1982. Limnological investigations: Lake Koocanusa, Montana Part 4: factors controlling primary productivity [special report 82-15]. Prepared for: USACE, Seattle, WA.
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PART II - NARRATIVE

Section 7. Abstract

The Libby Mitigation Program implements on-the-ground restoration actions, and research and monitoring to mitigate NPPC-approved fisheries losses caused by the construction and operation of Libby Dam in northwestern Montana. Previously separate but related projects were combined in this umbrella program at the request of BPA and ISRP. We are attempting to reduce proliferating bureaucratic process and increase efficiency in the implementation of measurable, cost-effective fisheries improvements.

Section 8. Project description

a. Technical and/or scientific background

Completion of Libby Dam in 1972 lead to profound biological and physicochemical changes in the Kootenai Subbasin, the second largest tributary to the Columbia River (Woods 1982; Chisholm et al. 1989; Skaar et al. 1996; Snyder and Minshall 1996). Libby dam terminated upstream fish migrations and caused a discontinuity between fish communities above and below the dam. Inundation of 109 miles of the mainstem Kootenai River and 40 miles of highly productive, low gradient tributary stream habitat occurred when Libby Dam filled (MFWP, CSKT and KTOI 1997). Annual reservoir operations resulted in extreme fluctuations in reservoir surface area and volume and river stage, effecting all biological trophic levels in the impoundment and river downstream (Marotz et al. 1996). Reservoir fluctuations impact revegetation of the reservoir varial zone resulting in a littoral zone of nondescript cobble/mud/sand bottom with limited available structure. River operations for power cause rapid flow fluctuations (as much as 400% change in daily discharge) which are inconsistant with the normative river concept (ISAB 1997) and create a wide varial zone that is biologially unproductive (Perry and Huston 1983; Cushman 1985; Hauer and Stanford 1997).

Fish populations throughout the Kootenai River Drainage have demonstrated responses indicitive of ecosystem collapse (Partridge 1983; Anders 1993; Anders 1994; Paragamian 1994; Williams 1961). Libby Dam has converted the Kootenai River from a lotic to lentic environment with species responses reflecting this manipulation. Westslope cutthroat and rainbow trout captured during annual gillnetting on Libby Reservoir have declined significantly from early post-impoundment levels of 10% and 14% to current levels 0.2% and 0.3% of the total catch. Conversely, non-game species such as northern squawfish and peamouth chub (not abundant pre-impoundment) have increased significantly in gill net catches to comprise up to 87 percent of the total catch (Chisholm et al. 1989; Dalbey et al. 1997). Similar impacts have been observed in the tailwater below Libby Dam. Barriers have been deposited in critical spawning tributaries to the Kootenai River through the annual deposition of bedload materials (sand, gravel, and boulders) at their confluence with the river (Marotz et al. 1988). The Kootenai River (pre-impoundment) contained sufficient hydraulic energy to annually remove these deltas whereas sufficient hydraulic energy is lacking from the post-impoundment Kootenai River. Reversal of the Kootenai River hydrograph and alteration of the thermograph have caused impacts typical of tailwaters. Native fish populations that have been reduced due to impoundment include burbot, which are an estimated 10% of pre-impoundment levels with current hoopnet catches of 0.002-0.168-fish/hoopnet hour. Westslope cutthroat trout populations have been in decline based on 24 years of population estimates (Huston et al. 1984; Dalbey et al. 1997). In 1973, 44 percent of trout captured were westslope with angler catch rates recorded at 0.5 fish/hour, ranking the Kootenai River among other blue ribbon trout streams in Montana. Estimates in 1994 document significant population reductions with less than five percent of the trout captured being westslope cutthroat trout (MFWP data files). White Sturgeon populations were listed as endangered in the Kootenai River on October 6th, 1994 with very little recruitment since 1974 (U.S. Federal Register Vol 59, No. 171).

Drawdown Mitigation

Drawdown and discharge limits were placed on Hungry Horse and Libby dams by measures 903(a) and (b) of the Northwest Power Planning Council's Fish and Wildlife Program (NPPC 1987). The NPPC Program directs Bonneville Power Administration to fund the mitigation of fisheries losses caused by reservoir drawdowns for power operations in excess of limits set at Libby Dam(90-110 feet). These drawdown limits remain in effect until an updated operating plan called Integrated Rule Curves (NPPC 1994) are implemented.

Reservoir drawdowns have frequently exceeded the designated limits during the last decade. In November 1993, Montana Fish, Wildlife & Parks (FWP) and the Confederated Salish and Kootenai Tribes (CSKT) initiated a three year program to mitigate fisheries losses caused by excessive drawdowns during the period 1987 through 1991 (Marotz and DosSantos 1993). Fisheries impacts again occurred when the draft limits were exceeded in 1993 at Libby Reservoir. Fisheries losses incurred due to these power operations could not be evaluated at the time of the original mitigation proposal. Losses were later estimated by comparing paired simulations using the quantitative biological models HRMOD and LRMOD (Marotz et al. 1996) duplicating techniques described by Marotz and DosSantos (1993).

Growth of the target species in the model, kokanee, was reduced by 1.1 to 1.6 percent in length and 3.3 to 4.6 percent in weight as the drawdown limit was exceeded. Angling pressure varies with fish abundance and size (Chisholm and Hamlin 1987; FWP unpublished files).

Estimation of the economic value attributable to the biological effects listed above is difficult. We can only guess at the value of dwindling fish populations (eg. bull trout, westslope cutthroat, burbot etc.) to future generations, so must focus on the potential fisheries benefits in terms of angler days. Estimated annual fisheries losses during the period 1989 through 1991 ranged from $748,374 to $1,759,969 (Marotz and DosSantos 1993). In 1993, reservoir drawdown and estimated biological effects were similar to 1989, or an approximate loss of $1.7 million. Mitigation measures are listed in the attached objectives and tasks. Mitigation measures are designed to partially offset fisheries losses..

Libby Reservoir.

In 1993, Libby Reservoir was drafted to 136 feet below full pool, exceeding the 90 to 110 foot drawdown limit. Inflow volume was low enough to maintain discharges within flood stage limitations without drafting below the 90 foot draft limit. When the limit was exceeded, aquatic resources were confined within a reduced reservoir volume as the surface area diminished. This resulted in an overall loss in aquatic production and increased the potential for high predation rates on juvenile kokanee, trout and whitefish as fish were concentrated in a smaller pool.

Primary production, the base of the aquatic food web, declined by 4.8 percent during 1993 when drawdown exceeded 90 feet. Also, deep drawdowns reduce the probability that the reservoir will refill during the following summer. Since primary production is maximized when the reservoir remains near full pool during the warm months (June through September), impacts due to excessive drafts are exacerbated when the reservoir fails to refill.

Reservoir drawdown reduces the surface area and volume of the pool, thus reducing zooplankton production. This important food for kokanee, young trout and adult trout during the winter, was reduced 4.7 percent due to excessive drawdown in 1993. Reduced reservoir volume and thus, more rapid water replacement in the pool, results in greater downstream loss of zooplankton.

Benthic insect production, an important springtime food supply for insect eating fish species, was reduced by 25.8 percent when drawdown exceeded 90 feet in 1993. Insect larvae dry or freeze when water recedes during reservoir drawdown. One excessive draft can impact benthic insect production for over two years.

Terrestrial insect deposition is reduced as the reservoir surface area shrinks and water recedes from shoreline vegetation. In 1993, excessive drawdown reduced the accumulation of this important summer / fall food supply by 11.8 percent (Coleoptera), 2.0 percent (Hemiptera), and 0.6 percent (Homoptera). There as little effect on Hymenoptera, presumably because of their better flying ability (wider dispersal from shoreline vegetation) and later seasonal activity period.

Trophic responses reveal that aquatic and terrestrial insects are effected to a greater extent than plankton. Stomach contents have shown that trout and whitefish eat mainly insects during spring, summer and fall, so are more severely impacted by reduced food availability than are planktivorous species (eg. kokanee, Columbia River chub etc.). Long-term monitoring has shown that rainbow and cutthroat trout populations have stabilized at low levels in the reservoir. Mountain whitefish are seldom captured anymore in seasonal population monitoring (Dalbey et al. 1997, in final draft). Spawning runs of trout in reservoir tributaries have shown a continuous decline since impoundment (Snelson et al. 1997, in final draft; Marotz et al. 1988; Marotz and Fraley 1986). The above impacts have been linked to decreased survival, reproductive success, fecundity and shifts in species relative abundance. Columbia River chubs are now the most abundant species in Libby Reservoir.

White Sturgeon, also native to the drainage, are currently listed under ESA provisions. Native burbot (also known as ling, *Lota lota)* once provided a popular fishery throughout the Kootenai system. The burbot fishery appears to have begun to decline in the early 1960's (Hensler 1996). But population declines have continued to occur since the construction of Libby Dam in 1972 (Paragamian 1993). The once robust population appears to persist at very low levels in both the middle and lower Kootenai.

In the upper Kootenai declines in numbers and in the range of whitefish and westslope cutthroat trout have been severe when compared to the late 1970's and 1980's (MFWP, CSKT and KTOI 1997; Snelson et al. 1997, Marotz et al.1988, Huston et al. 1984). ESA listing for either species may be warranted in this segment.

Bull trout populations in the upper Kootenai (including the Kootenai River in British Columbia) appear to be stable (Westover 1997, Dalbey et al. 1997). The transboundry population shared with Canada is numerically one of North America's strongest metapopulations as evidenced by recent spawning redd surveys and radio telemetry studies performed jointly by BC Environment and Montana Fish, Wildlife and Parks (BPA projects 9401000, 8346700) and a migration trap operated by BC Environment on the Wigwam River (BC) A major concentration of spawning in the upper Kootenai occurs in a previously roadless, 27 km of the Wigwam River in British Columbia (the headwaters of the Wigwam River reach into Montana). A long-term timber harvest program began in the Wigwam drainage in 1997. Primary haul roads were constructed into the drainage in the summer of 1997 and timber harvest and additional road construction is expected to continue this winter.

Cursory helicopter redd surveys conducted by jointly by MFWP (BPA project 9401000) and BCMOE, in October 1997, 1998 of other drainages in the Upper Kootenai system, did not reveal any other major spawning concentrations except in the Skookumchuk River. None neared the size of the Wigwam River run.

While the Upper Kootenai population is considered to be quite strong, concentration of a large segment of the reproductive capability of the drainage is directed to a relatively tiny portion of the system. This potentially places the population at risk. The risk is heightened considering the construction of new roads and increased timber harvest in the Wigwam drainage.

While historic population trend data for bull trout in the other two segments of the Kootenai drainage are largely unavailable, both segment's populations are in danger from hybridization, subdivision, dam operation and illegal harvest (Montana Bull Trout Scientific Group 1996). Aggressive conservation of the upper Kootenai metapopulation may provide a critical genetic reserve for restoration of stocks in the middle and lower Kootenai segments.

Key subbasins within the Kootenai drainage, which are critical to native species restoration, are experiencing a rapidly progressing change in land ownership and management patterns. Subdivision and subsequent residential development of much of the agricultural and timber lands adjacent to waterways in the drainage likely poses one of the greatest threats to weak but recoverable stocks of trout species mentioned above. Plum Creek Timber Company, a major landholder in the Kootenai system is currently divesting itself of large tracks of its lakeshore and streamside holdings basin-wide. Growth of small tract development throughout the Tobacco River valley and its tributaries is occurring at a record rate. This is also true for the majority tributaries to the middle Kootenai, placing

many important westslope cutthroat and bull trout spawning tributaries and recovery areas in peril.

Immediate to short-term action is going to be required to protect stream and riparian corridors through many of these areas if cost-effective recovery efforts are to be implemented. Delaying the commitment of resources to establish permanently protected stream corridors through easement, long-term management agreements and purchase of fee title in these stream corridor areas, is certain to drastically balloon the cost and possibility of long-term persistence of native species in much of their range.

b. Rationale and significance to Regional Programs

The Libby area projects are sufficiently similar in scope to warrant restructuring into one overall project. Specifically, these are the "Mitigation for the Construction and Operation of Libby Dam" (Project 8346700), the "Mitigation for Excessive Drawdowns at Libby Dam" (Project 9401001), and the "Libby and Hungry Horse Technical Analysis "(Project 8346500). This action was supported by the CBFWA Resident Fish Managers (RFM) and recommended by the ISRP review of FY 99 proposals. All of the projects were determined to be adequate by the ISRP. In Appendix A of the ISRP review of Project 8346700, the ISRP stated that "…the proposal seems to duplicate what other Kootenai projects may be doing and offers little physical mitigation." They go on to state "This program should be organized into an umbrella proposal with sub-proposals on the major objectives." The latter comment referring to "physical mitigation" can best be addressed by combining on-the-ground actions into one umbrella project. The organization provided by the Libby Mitigation and Implementation Plan submitted to the Northwest Power Planning Council explains and directs ongoing and future physical mitigation. On Project 8346700, the ISRP states "…it would seem more reasonable for this proposal to be submitted as a subproject under an overall project umbrella"; we agree with this statement and have been directed to do so by the RFM as well. On Project 9401001, The ISRP states "The proposal is well coordinated with other regional projects and well positioned with the Fish and Wildlife Program and other plans." We believe that combining these related projects will improve on this coordination, reduce process and create greater efficiency in project implementation and monetary expenditures.

Hydropower-related effects on the Kootenai Watershed are documented in the Libby Dam Fisheries Mitigation and Implementation Plan for Losses Attributed to the Construction and Operation of Libby Dam and previous project reports. The Mitigation Plan details quantified fish losses above and below Libby Dam as called for by the FWP. Kootenai River white sturgeon are endangered (USFWS 1997); less than 1500 individuals remain. Bull trout are listed as threatened. The bull trout population below Libby Dam has too few subpopulations to be considered a stable metapopulation. However, the population in the Canadian headwaters of Libby Reservoir is believed to be the strongest metapopulation in existence. Westslope cutthroat trout have been petitioned for listing under ESA and may be listed during the next year. Mitigation projects targeted at enhancement of native

populations in the Kootenai Basin were compiled in the Libby Mitigation and Implementation Plan. This document was developed as a collaborative programmatic assessment with the Salish and Kootenai Tribes and the Kootenai Tribe of Idaho. Further coordination is conducted with Idaho Fish and Game and British Columbia Ministry of Environment. White Sturgeon Recovery efforts are consistent with the internationally developed White Sturgeon Recovery Plan (USFWS 1997). This program directly addresses the FWP mandate to enhance hydropower-affected fish stocks in the Kootenai Basin through on-the-ground habitat enhancement efforts that alleviate limiting factors to native species populations. Projects reclaiming critical spawning, rearing, and over-wintering habitats have been completed, or are ongoing, as pilot mitigation projects. These projects are being completed using grassroots watershed workgroups comprised of landowners, agencies, sportsmen's groups and local, state and federal government coalitions.

The IFIM river model will be linked with the existing reservoir model LRMOD to complete the integrated watershed framework. The IFIM research is calibrating simulations of hydraulic conditions (stage/discharge and velocities) and fish habitat from Libby Dam to Kootenay Lake, British Columbia, Canada at various discharges from Libby Dam. An optimization program is scheduled for development to allow managers to assess tradeoffs between the requirements of reservoir and riverine biota, when conflicts occur between reservoir operation and river flow limits as per the FWP. This project provides data used to develop and refine operating protocols for Libby Dam (IRCs), including Tiered Flow augmentation for the recovery of the endangered Kootenai River white sturgeon. The IRC concept has been recognized by the ISG as a tool for restoring normative conditions in rivers below storage projects. The IRCs can be applied to other projects given the necessary data. A simplified version of the models was used during the Columbia Basin System Operation Review process on Dworshak, Grand Coulee and Pend Oreille. This screening model produces qualitative results that can be used to direct field sampling efforts, which in time will provide the data for quantitative subroutines to construct a full-scale quantitative evaluation model.

This project also addresses mitigation for excessive reservoir drawdowns for power operations at Libby Dam in excess of drawdown limits stated in the FWP (measures 903a and 903b, NPPC 1987). The Integrated Rule Curve (measures 10.3B.6 and 10.3B.7, NPPC 1995) have not been implemented, so the original drawdown limits are in effect. Effects of several excessive drawdowns have yet to be mitigated. Native species aspects of this project are consistent with measure 10.1B, which accords the highest priority to weak, but recoverable, native populations injured by the hydropower system. Measure 10.2B requires that comprehensive management be carried out by the related Kootenai Focus Watershed Project (9648701). Funding for on-the-ground watershed projects is included in this proposal. Mitigation projects are directed by measure 10.3B, (specifically measure 10.3B.8) which instructs BPA to fund the design, construction and maintenance of mitigation projects. Research aspects are directed by measure 10.3B.5, which instructs BPA to continue to fund studies to evaluate the effects of Libby Dam.

c. Relationships to other projects

As stated in the sub-proposals, project objectives are to identify, enhance and maintain native trout species in the Kootenai River system. These objectives compliment the concerns and efforts of the US Fish and Wildlife Service, and the Montana Bull Trout Recovery Team. These agencies are all advocating for the recovery of native species in the Kootenai, particularly white sturgeon, bull trout and westslope cutthroat. All of the projects proposed for combination compliment the US Forest Service Forest Plan to enhance native species through habitat restoration projects.

Changes in dam operation for recovery actions in the lower Columbia affect resident fish in the headwaters (ISAB 1997), and must be balanced to benefit all native fish species. Actions taken must also be affordable or the public will likely stop the effort. To do this, decision-makers must have tools to assess tradeoffs and make wise choices.

The radio-telemetry work of this project will identify migration habits, habitat preferences and spatial distribution of species in the Kootenai system. Much of this information can be utilized by the IFIM project in the Flathead watershed (Projects 9401002 and 9502500).

The umbrella projects of Libby Fisheries Mitigation (LFM) are the mechanism by which local watershed plans developed by the Focus Watershed Coordination – Kootenai River (FWC, Project # 9608720) are funded and implemented. FWC provides technical support and direction for stream geomorphic and hydrolic inventory and stream design, and faciltiates public input and support for the mitigation program. FWC also negotiaties and faciltates cost shares for the LFM, extending the positive impacts of BPA funds. LFM provides the necessary technical and biologic information and data to FWC for developing effective and implementable watershed plans.

d. Project history (for ongoing projects)

See project sub-proposals

e. Proposal objectives

See project sub-proposals

f. Methods

See project sub-proposals

g. Facilities and equipment

The Libby Field Station of MFWP, located on state property, has two office buildings containing office space, a wet lab, and computer equipment sufficient for project staff. A spring and pond area at the field station provide a water source and diverse habitat for meeting experimental isolation habitat objectives. A workshop and boatshed are situated near the office buildings. State vehicles and work boats are available for project use. Electrofishing equipment (boat-mounted, bank and backpack units), surveying and GPS equipment, SCUBA gear, lake and river sampling devices for sampling/monitoring all trophic levels are available at the site. A Bobcat with apparatus designed for habitat enhancement work is time-shared with the Hungry Horse Mitigation Program. Minor tools and equipment are included in the project budget.

h. Budget

See umbrella sub-proposals for justification of individual project budgets.

Section 9. Key personnel

BRIAN MAROTZ

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Education

Master of Science – Fisheries Management
Louisiana State University - Baton Rouge, Louisiana.
Estuarine Biology

15 Credits: Gulf Coast Research Institute
Ocean Springs, Mississippi.
Marine Science

Bachelor of Science – Biology (Aquatic Sciences)
University of Wisconsin - Stevens Point, Wisconsin.
Freshwater Biology

16 Credits: S.E.A. Semester at Sea, Boston University
Woods Hole, Massachusetts
Marine Biology

Professional experience

1991-Present Fisheries Program Officer, Montana Fish, Wildlife & Parks
Kalispell, Montana
Duties: Supervise Special Projects Office, Hydropower Mitigation and Focus Watershed Programs. Oversees all BPA sponsored projects in the Upper Columbia Basin of Montana. Directly supervise principal investigators and represents MFWP at CBFWA resident fish managers and Members meetings.

1989 – 1991 Fisheries Biologist, Montana Fish, Wildlife & Parks
Kalispell, Montana
Duties: Hungry Horse Reservoir Research, Develop Hungry Horse Mitigation Program, Computer Modeling Flathead and Kootenai Drainages, Develop Integrated Rule Curves

(IRCs) for Montana Reservoirs.

1985 – 1989 Fisheries Biologist, Montana Fish, Wildlife & Parks
Libby, Montana
Duties: Libby Reservoir Research, Kootenai Instream Flow Project, Computer Modeling Flathead and Kootenai Drainages, Develop Integrated Rule Curves (IRCs) for Montana Reservoirs.

1984 – 1985 Research Associate, Louisiana State University - Baton Rouge, Louisiana
Duties: Estuarine Research to control salt water encroachment to Estuarine Marsh on the Sabine National Wildlife Refuge. Developed Operating Plan for Water Control Structures to Allow Migration of Catadromous Fish and Crustaceans

Publications
Pertinent Publications Listed in this Document

Awards
1994 Governor's Award for Excellence in Performance as an Employee of the State of Montana

1994 Director's Award for Excellence as an Employee of Montana Fish, Wildlife & Parks

1989 Certified Fisheries Scientist
American Fisheries Society

See umbrella sub-proposals for personnel associated with each project.

Section 10. Information/technology transfer

Project results will be published in BPA reports and, where applicable, peer reviewed journal articles. Monthly or quarterly reports to all agency and citizen groups are produced. We also plan on creating and maintaining a web page to keep interested publics informed of pertinent activities.

Congratulations!